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BRICK G POWER
TRASK BRITT & ROSSA
P O BOX 2550
SALT LAKE CITY, UT 84110

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PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KENNETH W. MARR

Appeal 2009-011503
Application 09/277,893
Technology Center 2800

Before CARLA M. KRIVAK, THOMAS S. HAHN, and
ELENI MANTIS MERCADER, *Administrative Patent Judges*.

HAHN, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant invokes our review under 35 U.S.C. § 134(a) from the final rejection of claims 17-33, 50-72, and 74-105. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

STATEMENT OF THE CASE

Introduction

Appellant claims a method for fabricating a fuse on a semiconductor device by disposing and patterning both a first conductive material layer and a second metal silicide layer over an insulator structure.² Illustrative independent claim 17 reads as follows:

17. A method of fabricating a fuse upon a semiconductor device, comprising:

disposing a layer of conductive material over an insulative structure of the semiconductor device;

patterning said layer of conductive material to define at least two spaced apart terminal sites;

removing conductive material of said layer in areas around said spaced apart terminal sites;

disposing a layer of metal silicide over the semiconductor device, including adjacent to said insulative structure exposed between said at least two terminal sites; and

patterning said layer of metal silicide so as to define at least two terminal regions of the fuse, each of which is in contact with a corresponding one of said at least two terminal sites of conductive material, and a central region disposed between said at least two terminal regions and in contact with said insulative structure.

² See generally Spec. 4:27 – 5:1, 8-25; 9:9 – 12:3; Figs. 3-7.

Rejections

The Examiner relies on the following prior art references to show unpatentability:³

| | | |
|-----------|--------------|---------------|
| Fischer | US 5,185,291 | Feb. 9, 1993 |
| Sandhu | US 5,231,056 | July 27, 1993 |
| Degelormo | US 5,242,859 | Sep. 7, 1993 |
| Chen | US 5,712,206 | Jan. 27, 1998 |
| Ukeda | US 6,069,055 | May 30, 2000 |
| Mitani | JP 59-154038 | Sep. 3, 1984 |

The Examiner, under 35 U.S.C. § 103(a), rejected:

1. Claims 17, 19-24, 26-33, 102, and 103 as unpatentable over Fischer and Chen (Final Action 2-5);
2. Claims 18, 50, 51, 55-60, 62-68, 71, 74-86, 88-96, 101, 104, and 105 as unpatentable over Fischer, Chen, and Mitani (Final Action 5-15);
3. Claim 25 as unpatentable over Fischer, Chen, and Sandhu (Final Action 6);
4. Claims 52-54, 69, 70, and 72 as unpatentable over Fischer, Chen, Mitani, and Degelormo (Final Action 10, 16);
5. Claims 61 and 87 as unpatentable over Fischer, Chen, Mitani, and Sandhu (Final Action 11, 16); and
6. Claims 97-100 as unpatentable over Fischer, Chen, Mitani, and Ukeda (Final Action 17).

*Appellant's Contentions*⁴

Appellant collectively asserts claims 17, 19-24, 26-33, 102, and 103 are patentable without separately arguing any identified claim (App. Br. 13-

³ Effective filing dates for these documents precede Appellant's earliest effective filing date and are not at issue.

⁴ Arguments that Appellant did not make in the Appeal Brief and Reply Brief are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

14). We, accordingly, select independent claim 17 as representative for the group pursuant to our authority under 37 C.F.R. § 41.37(c)(1)(vii). What Appellant argues is that Fischer “by touting the usefulness of aluminum, tungsten, or polysilicon . . . teaches away from . . . substitut[ing] a silicide for one of these materials” (App. Br. 14). Appellant also argues that “[n]either Fischer nor Chen [(i)] provides one of ordinary skill in the art with any reason to substitute a silicide for one of the conductive layers of the fuse of Fischer [, and (ii)] . . . includes any teaching or suggestion that would have provided one of ordinary skill in the art with any reason to add an additional layer of conductive material at either terminal end of the single layer silicide fuse taught in Chen” (App. Br. 13).

Appellant separately asserts the patentability of claim 18 (App. Br. 14-5). This claim is rejected as obvious over Fischer, Chen, and Mitani (Final Action 5-6). Appellant contends all the cited references fail to provide “one of ordinary skill in the art with any clear guidance as to the function of metal silicide as the fusible element of a multi-layer fuse” (App. Br. 15).

Appellant relies on the above contentions for arguing the patentability of the other appealed claims with accompanying assertions that other cited references fail to cure asserted Fischer and Chen deficiencies (App. Br. 16-22).

Issues on Appeal

1. Did the Examiner err in rejecting representative claim 17 as being obvious because Fischer and Chen, alone or in combination, fail to teach or suggest the recited metal silicide layer?
2. Did the Examiner err in rejecting claim 18 as being obvious because Fischer, Chen, and Mitani, alone or in combination, fail to teach or suggest the recited metal silicide layer?

FINDINGS OF FACT

The record supports the following Findings of Fact (FF) by a preponderance of the evidence:

Foster

1. Fischer describes a method for making integrated circuit devices with an electrical conductive path that can be severed by electrical current, i.e., a fuse (Abstract).
2. Fabrication of Fischer's conductive fuse path is disclosed as employing two steps to produce a double layer path:
first, a layer of conductor material is deposited on a dielectric surface, and locally reduced in thickness by etching at one or several points selected for fusing, and, second, a further layer of conductor material is deposited, and then etched to produce a desired conductive path passing through such points (Abstract; *see also* col. 2, ll. 5-13).
3. Fischer further discloses that "[w]hile, typically, the same conductor material may be used for [fuse path] layers 11 and 12 shown in FIG. 2 and 3, the use of different materials is not precluded" (col. 2, ll. 59-61).

4. Chen describes a method for forming an integrated circuit structure with electrical fuses (Abstract). The materials for the fuse are disclosed as “preferably composed of aluminum or titanium tungsten, a silicide, such as tungsten silicide, platinum silicide, polysilicon, or a polycide, such as titanium polycide, tungsten polycide or molybdenum polycide and is more preferably formed of tungsten silicide” (col. 5, ll. 59-63).

PRINCIPLES OF LAW

The Supreme Court has held that 35 U.S.C. § 103 forbids issuance of a patent for claimed subject matter that “‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (citation omitted). The Court also explained that “when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *Id.* at 416 (citation omitted).

ANALYSIS

Claims 17, 19-24, 26-33, 102, and 103

We have analyzed the Examiner’s rejection in light of Appellant’s arguments (App. Br. 13-14; Reply Br. 5-7), and we disagree with Appellant’s conclusions.

Representative claim 17 is rejected as being obvious over Fischer and Chen (Final Action 2-3). The Examiner finds Fischer teaches all the limitations of claim 17 except for a recited second conductive fuse layer being a metal silicide (Final Action 3). Use of a metal silicide, the Examiner

finds is taught by Chen (*id.*). Specifically, the Examiner acknowledges, finds, and concludes that:

Fischer et al. does not disclose the second conductive layer as a metal silicide. Chen teaches in column 5, lines 57-65 a conductive layer (62) for a fuse that is a metal silicide. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the metal silicide layer of Chen in the method of fabricating a fuse upon a semiconductor device of Fischer et al. in order to use a preferred conductive material for the fuse that is well known in the art as stated by Chen in column 5, lines 57-65.

(*Id.*). Reviewing Fischer and Chen, we agree with and adopt the Examiner's findings that Fischer teaches employing a dual layer fuse path that can be made of different materials, and that Chen teaches that metal silicide was a known fuse layer material (FF 1-4). We also agree with and adopt the Examiner's reasoning for combining Fischer and Chen, because we find the reasoning to be rational. Accordingly, we find the Examiner did not err, under § 103, in modifying Fischer with Chen's teaching for using metal silicide as a second fuse layer material.

Concerning Appellant's arguments, we do not find Appellant's contention that Fischer teaches away from using conductive materials other than aluminum as a fuse layer material supported by the record (App. Br. 14). In particular, we fail to find that Appellant has identified Fischer's teachings or other evidence that discloses or suggests that use of materials other than aluminum is criticized, discredited, or otherwise discouraged. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (Mere disclosure of alternatives does not constitute teaching away.). In fact, we find Fischer discloses that "use of different materials is not precluded" (FF 3).

We also do not find that the Examiner erred in view of Appellant's further arguments that neither Fischer nor Chen teach or suggest (i) any reason to substitute a metal silicide for a conductive material layer, or (ii) "add[ing] an additional layer of conductive material at either terminal end of the single layer silicide fuse taught in Chen" (App. Br. 13).

As to Appellant's first argument, we find the cited prior art teaches that the recited structure elements, i.e., a double layer fuse structure and a metal silicide as a conductive material layer, were known in the art (FF 1-4). We further find Chen discloses that forming a layer of tungsten silicide "is more preferabl[e]" than using aluminum (FF 4; *see also* Ans. 17). Additionally, based on the record, we find the Examiner's combination yields no more than what one would expect from such an arrangement. Accordingly, we do not find the Examiner erred in the findings or the conclusion that the substitution of a known element in a combination that yields expected results renders the claimed subject matter obvious. *KSR* at 417.

Concerning Appellant's second argument, we agree with the Examiner's response that the rejection "does not rely upon adding a layer of Fischer into the process of Chen. Instead the rejection relie[s] upon modifying Fischer by substituting the preferred fuse material of Chen for the fuse material of Fischer" (Ans. 18). We, accordingly, agree with and adopt the Examiner's findings and reasoning for modifying Fischer by substituting the preferred Chen fuse conductive material as is addressed *supra*.

We will sustain the rejection of representative claim 17 along with the respective dependent claims 19-24, 26-33, 102, and 103.

Claim 18

Claim 18, which depends from base independent claim 17, is rejected as being obvious over Fischer, Chen, and Mitani (Final Action 5-6). Appellant contends Mitani does not remedy asserted Fischer and Chen deficiencies with respect to base claim 17 (App. Br. 15). Concerning this argument, we do not agree with Appellant because as addressed *supra* we agree with the Examiner's findings and combination of Fischer and Chen.

The Examiner explains that Mitani discloses disposing polysilicon onto an insulative structure, which is not taught or suggested by Fischer and Chen (Final Action 5). Appellant acknowledges that Mitani discloses disposing a polysilicon layer, but contends the Mitani polysilicon layer forms the fuse that is ruptured, which is not the rejected claimed subject matter (App. Br. 15). We agree with the Examiner's response that "Mitani is merely relied upon to teach using polysilicon as the lower layer in the two layer fuse of Fischer . . ." (Ans. 22). Appellant's argument does not address the Examiner's rejection.

Finally, Appellant contends that "none of the[] references [i.e., Fischer, Chen, or Mitani] would have provided one of ordinary skill in the art with any clear guidance as to the function of metal silicide as the fusible element of a multi-layered fuse" (App. Br. 15). For the reasons addressed *supra*, we disagree with Appellant's argument and agree with the Examiner's findings and reasoning for combining Fischer and Chen.

We, accordingly, will sustain the rejection of claim 18.

Claims 25, 50-72, 74-101, 104, and 105

Appellant relies on the above contentions for arguing the patentability of these claims with accompanying assertions that other cited prior art fail to cure asserted Fischer and Chen deficiencies (App. Br. 16-22). For the reasons addressed *supra*, we do not agree that the Examiner erred in rejecting these claims, nor do we find that Fischer and Chen are deficient.

We will sustain the rejections of claims 25, 50-72, 74-101, 104, and 105.

CONCLUSIONS

1. The Examiner did not err in rejecting representative independent claim 17 as being obvious over the combination of Fischer and Chen.
2. The Examiner did not err in rejecting claim 18 as being obvious over the combination of Fischer, Chen, and Matani.
3. Claims 17-33, 50-72, and 74-105 are not patentable.

ORDER

The Examiner's decision rejecting claims 17-33, 50-72, and 74-105 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2010).

AFFIRMED

Appeal 2009-011503
Application 09/277,893

gvw

BRICK G. POWER
TRASK BRITT & ROSSA
P O BOX 2550
SALT LAKE CITY, UT 84110